

What is claimed is:

1. A semiconductor laser module comprising:

a semiconductor laser configured to emit light;

an optical fiber having a tip end portion opposing said

5 semiconductor laser and formed in a lens-shaped configuration so as to optically couple the light emitted from said semiconductor laser;

an optical-fiber supporting member configured to support said optical fiber; and

10 at least one fixing member configured to support said optical-fiber supporting member, including

a supporting-member fitting portion having a channel into which said optical-fiber supporting member is placed and supported thereby,

15 a first fixing block portion and a second fixing block portion positioned on opposite sides of said supporting-member fitting portion so as to interpose said supporting-member fitting portion between said first fixing block portion and said second fixing block portion via a first gap and a second gap respectively,

20 a first bridge portion configured to bridge said first gap and to couple said first fixing block portion to said supporting-member fitting portion, and

a second bridge portion configured to bridge said second gap and to couple said second fixing block portion to said supporting-member fitting portion.

25 2. The semiconductor laser module of Claim 1, wherein:  
said channel being a groove portion.

3. The semiconductor laser module of Claim 1, wherein:  
said channel being a hole portion into which said optical-fiber supporting member is inserted so as to be fitted therein.

4. A semiconductor laser module comprising:

a semiconductor laser configured to emit light;

an optical fiber having a tip end portion opposing said semiconductor laser and formed in a lens-shaped configuration so as to

5 optically couple the light emitted from said semiconductor laser;

an optical-fiber supporting member configured to support said optical fiber; and

a group of fixing members including

10 a first fixing member configured to support said optical-fiber supporting member, including

a supporting-member fitting portion having a channel into which said optical-fiber supporting member is placed and supported thereby,

15 a first fixing block portion positioned on one side of said supporting-member fitting portion, and a second fixing block portion positioned at an opposite side of said one side of said supporting-member fitting portion so as to interpose said supporting-member fitting portion between said first fixing block portion and said second fixing block portion via a first gap and a  
20 second gap in a direction intersecting a longitudinal direction of the optical fiber, and

a first bridge portion configured to bridge the first gap and to couple said first fixing block portion to said supporting-member fitting portion and a second bridge portion configured to bridge the  
25 second gap and to couple said second fixing block portion to said supporting member fitting portion, and

at least one additional fixing member configured to support said optical-fiber supporting member, arranged at a predetermined

distance from said first fixing member, along the longitudinal direction of said optical fiber.

5. The semiconductor laser module of Claim 4, wherein:  
said channel being a groove portion.

5 6. The semiconductor laser module of Claim 4, wherein:  
said channel being a hole portion into which said optical-fiber supporting member is inserted so as to be fitted therein.

7. The semiconductor laser module of Claim 4, wherein:  
said first fixing member and said at least one additional fixing  
10 member being separate, non-integral members.

8. The semiconductor laser module of Claim 7, wherein:  
said channel being a hole portion into which said optical-fiber supporting member is inserted so as to be fitted therein.

9. The semiconductor laser module of Claim 8, wherein:  
15 said first bridge portion and said second bridge portion integrally connecting said first fixing block portion, said second fixing block portion, and said supporting-member fitting portion into a single member, wherein said first bridge portion and said second bridge portion share a torsional stress applied to said single member.

20 10. The semiconductor laser module of Claim 9, wherein:  
each of said first fixing block portion and said second fixing block portion being extended to a periphery of said at least one additional fixing member.

11. The semiconductor laser module of Claim 9, wherein:  
25 each of said first bridge portion and said second bridge portion being arranged at a substantially same height as a center of a propagation path of the light emitted from said semiconductor laser.

12. The semiconductor laser module of Claim 2, further comprising:

a base including a semiconductor-laser mounting member and a fixing-member mounting member provided on said semiconductor-laser mounting member.

13. The semiconductor laser module of Claim 12, wherein:

5       said semiconductor-laser mounting member and said base are integrally formed as a single member.

14. The semiconductor laser module of Claim 12, wherein:

      said fixing-member mounting member having a first recessed portion corresponding to said first fixing block portion and a second  
10    recessed portion corresponding to said second fixing block portion so as to fix said first fixing block portion by said first recessed portion and to fix said second fixing block portion by said second recessed portion.

15. The semiconductor laser module of Claim 14, wherein:

      each of said group of fixing members having a joining portion in a  
15    same plane.

16. The semiconductor laser module of Claim 14, wherein:

      said fixing-member mounting member of said base having an upper surface arranged at a substantially same height as a center of a propagation path of the light emitted from said semiconductor laser.

20    17. The semiconductor laser module of Claim 14, wherein:

      said first fixing member is formed of a material having a substantially same thermal expansion coefficient as said optical-fiber supporting member.

18. The semiconductor laser module of Claim 17, wherein:

25       said first fixing member is formed of at least one of a Fe-Ni alloy, a Fe-Ni-Co alloy, and a metal having a smaller Young's modulus than that for the supporting-member fitting portion.

19. The semiconductor laser module of Claim 15, wherein:

said joining portion comprise laser-welded portions.

20. An optical axis aligning method of a semiconductor laser module comprising the steps of:

supporting an optical fiber with an optical-fiber supporting member  
5 at a position opposing a light emitting surface of a semiconductor laser;

performing a first step of optically coupling a center of a laser light  
of said semiconductor laser to a center core of said optical fiber in a state  
where said optical-fiber supporting member is inserted and fitted by a  
supporting-member fitting portion of a first fixing member, so as to fix a  
10 fixing block portion of said first fixing member to a base;

performing a second step of optically coupling the center of the  
laser light of said semiconductor laser to the center core of said optical  
fiber, where said fixing block portion is fixed to said base to fix said  
optical-fiber supporting member to said supporting-member fitting portion  
15 of said first fixing member;

performing a third step of optically coupling the center of the laser  
light of said semiconductor laser to the center core of said optical fiber by  
moving a far end side of said optical-fiber supporting member from said  
semiconductor laser about a fulcrum constituted by a first bridge portion  
20 and a second bridge portion of said first fixing member in a state where  
said optical-fiber supporting member is fixed to said supporting-member  
fitting portion, so as to fix a second fixing member to said base; and

performing a fourth step of optically coupling between the center of  
the laser light of said semiconductor laser and the center core of said  
25 optical fiber by further moving said far end side of said optical-fiber  
supporting member from said semiconductor laser, so as to fix said optical-  
fiber supporting member to said second fixing member.

21. The optical axis aligning method of a semiconductor laser module of

Claim 20, wherein:

said performing a first step of optically coupling includes coupling in an X-axis direction, a Y-axis direction, and a Z-axis direction;

said performing a second step of optically coupling includes  
5 aligning to said optical-fiber supporting member in the Z-axis direction and the Y-axis direction;

said performing a third step of optically coupling includes aligning to said optical-fiber supporting member in the X-axis direction; and

said performing a fourth step of optically coupling includes aligning  
10 to said optical-fiber supporting member in the Y-axis direction.

22. A semiconductor laser module comprising:

means for emitting a light from a semiconductor laser;

means for optically coupling an optical fiber to the light from the semiconductor laser;

15 means for supporting said optical fiber;

means for supporting an optical fiber supporting member;

means for aligning a center of the light with a core of the optical fiber first in an X-axis direction, a Y-axis direction, a Z-axis direction, then in the Z-axis direction and Y-axis direction, followed by alignment in the  
20 X-axis direction and the Y-axis direction.